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of the Actuarial Society had the coöperation of a committee of Insurance Department actuaries appointed by the National Convention of Insurance Commissioners, and in the entire work it had the coöperation of a committee appointed by the American Institute of Actuaries, at the invitation of the Actuarial Society.

ROBERT HENDERSON.

An Index Number for State School Systems, by Leonard P. Ayres. New York, Russell Sage Foundation, 1920. Pp. 70.

Great interest has recently been aroused in educational circles throughout the country by the appearance of Dr. Ayres's book. Coming as it does from the pen of this expert on the subject of educational statistics, it presents in an authoritative manner the results of a careful study of statistical information with regard to education. The author computes for the several state systems an index number based upon ten sets of educational data. The data included are the following:

1. Per cent of school population attending school daily.
2. Average days attended by each child of school age.
3. Average number of days schools were kept open.
4. Per cent that high school attendance was of total attendance.
5. Per cent that boys were of girls in high schools.
6. Average annual expenditure per child attending.
7. Average annual expenditure per child of school age.
8. Average annual expenditure per teacher employed.
9. Expenditure per pupil for purposes other than teachers' salaries.
10. Expenditure per teacher for salaries.

It will be noted that the first five of these items refer to attendance, and the last five to financial matters. The question naturally arises as to the degree to which these items indicate the efficiency of educational procedure in the several states. Are there not other items, such as the achievements of pupils in standardized tests, the courses of study, etc., which would indicate more reliably the efficiency of the educational process? Dr. Ayres answers questions such as this in the following manner:

"If some great national agency were to undertake a survey of each of the forty-eight state school systems, it would surely report on many phases of their work not included in the items of the index. Among such phases would be the legal basis of the system, its organization, professional leadership and supervision, business management, course of study, teaching staff, plant and equipment, and the results of standard tests of classroom work.

"These elements, and others like them, are not directly included in the index, although some of them are crudely measured by the several items for financial expenditure. The sad fact is that, if there were available such information as surveys gather on most of the subjects suggested above, it would be still impossible to state the results in terms that could be included in an index number. The reason for this is that there is as yet little exact knowledge about education.

We do not know just what kind of teaching staff does the best work, or what kind of supervision is the most effective, or how many supervisors there ought to be, or how to measure organization in quantitative terms, or how to evaluate most of the other matters on which we report in survey making.

"Under present circumstances the best that can be done in an undertaking of the present sort is to take all the items for which continuous, reliable data can be secured and to combine them by as careful and impartial methods as can be brought to bear. In the present case it is to be regretted that only ten items could be found that seemed to meet the requirements that were laid down at the outset of the work. If the number of accurate and significant series used were greater, the reliability of the results would be enhanced."

The data and the index numbers based thereon are presented for the years 1890, 1900, 1910, and 1918. Tables are included showing the rank of each state for each of the four periods, and changes in rank are graphically indicated.

Table 13 presents two figures for each state for 1918, one figure based on the five data relating to attendance, and the other on the five financial in their nature. The author calls attention to a significant matter shown by this table. " . . . There is a generally close agreement between the educational figures in the first column and the financial ones in the second column in the matter of relative magnitude. In general, the high educational figures are accompanied by high financial ones, and the low educational totals by correspondingly low financial ones. This is one way of saying that a state having a long school term, high attendance, and many children in high school must pay more for the upkeep of its educational system than one which has none of these advantages. Another interpretation of the figures, which also is valid, is that the figures for school expenditures do have a close relation to those which show the amount of education given and tell how many are in high school, and that they are important indicators of the efficiency of the system and the quality of the education the children receive."

In reference to the accuracy of some of the data included, it should be noted that some times capital expenditures, such as loans for constructing new school buildings, are included by reporting authorities under the head of amounts spent for educational purposes, and sometimes they are not so included. Unless care be taken that uniform methods have been pursued in all cases, the validity of the relative standing of the several states would be impaired.

The author calls attention to the fact that large fluctuations take place in educational expenditures in cities on account of extensive building programs, and he states that "the use of the present index number would give misleading results if computed for cities." In some cases one or two large cities include a very large proportion of the population of a state. In such cases the accuracy of comparison among states may be impaired.

The year 1918 is, perhaps, not a good one for comparison of index numbers, because it occurred during a period when teachers' salaries were being adjusted throughout the United States on account of the increased cost of living. In some states a new salary scale had already been adopted in 1918, while in others a new scale was still under consideration. Under these conditions, comparison

of index numbers in 1920 or in 1921 would give a more accurate indication of the rank of the several states. Of course, it may be stated in reply that the figures for 1918 show the conditions as they existed during that year.

In the summary, Dr. Ayres states that "in general the index number should be regarded as reliable rather than precise. Its methods are rigid and impartial, but not considerative nor interpretative. It measures results without considering causes. The purposes of the index number is to make it possible for state school systems to measure their progress from year to year, and to compare their attainments with those of their neighbors."

This book will certainly help to concentrate attention upon the importance of the ten items in the operation of state school systems, and will stimulate all those concerned with public education to increased effort. Dr. Ayres has done a valuable piece of work which will tend to benefit public education.

DAVID E. WEGLEIN.

Baltimore.

Some Dangers in Establishing a Pension System and the Proper Precautions, by Edward L. Dodd. (University of Texas Bulletin, No. 1905.) 1919. Pp. 1 to 26.

In this monograph, Mr. Dodd takes as a model the pension system of the Teachers' Insurance and Annuity Association of America, organized by the Carnegie Foundation. He points out the leading features of this system and urges that the pension systems which some institutions might establish independently should be modeled after the pattern of the Teachers' Association.

Mr. Dodd lays down the following principles as the cardinal requirements of a pension system:

1. The pension must be paid out of a pension fund accumulated and administered in accordance with sound actuarial principles. It must not be paid by an institution out of the current salary budget.

2. This pension fund rightly belongs to the teachers who are to be the pensioners, because it is made up of portions of their salaries, the payments of which have been deferred to pension age. Mr. Dodd argues that if an institution did not maintain a pension system, it would be in a position to pay larger salaries to the teachers because the amounts paid out in pensions could be distributed among the teachers in the form of larger salaries.

3. Since the instructor pays for his pension, either in the form of direct contribution into the fund or in the form of a reduced salary because his institution maintains the pension fund, each instructor should be required to pay the cost of his own pension only and should not be taxed to bear part of the cost of the pension of the older men. In other words, each generation should pay for itself.

4. If the periodical contributions to the pension fund are invested at 4 per cent compound interest, the cost of the pension to each beneficiary will be cut in two, for the reason that at such compound interest rate, the annual contributions to the pension fund in the course of 30 or 35 years are approximately doubled by the interest earnings. Therefore, if an institution pays pensions out of the current salary budget and not out of a reserve fund specifically created for